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PATENT
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On

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TOWNSEND and TOWNSEND and CREW LLP

By:

IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

In re application of:

Katsunori Hayashi

Application No.: 10/822,116

Filed: April 8, 2004

For: Disk Array Apparatus and Power Backup Method for the Same

Customer No.: 20350

Confirmation No. 1717

Examiner: unassigned

Technology Center/Art Unit: 2655

PETITION TO MAKE SPECIAL FOR
NEW APPLICATION PURSUANT TO
37 C.F.R. § 1.102(d) &
M.P.E.P. § 708.02, Item VIII,
ACCELERATED EXAMINATION

Commissioner for Patents
P.O. Box 1450
Alexandria, VA 22313-1450

Sir:

This is a petition to make special the above-identified application in accordance with MPEP § 708.02, Item VIII, accelerated examination. The application has not received any examination by the Examiner.

(A) The Commissioner is authorized to charge the petition fee of \$130 under 37 C.F.R. § 1.17(h), and any additional fees that may be associated with this petition may be charged to Deposit Account No. 20-1430.

(B) All the claims are believed to be directed to a single invention. If the examiner determines that all the claims presented are not obviously directed to a single invention, then Applicant will make an election without traverse as a prerequisite to the grant of special status where the specific grouping of claims will be determined by the examiner.

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(C) A pre-examination search was performed by an independent patent search firm. A copy of the search report is provided herewith as Exhibit A. The pre-examination search includes a classification search and a keyword search. The searches were performed on or around March 29, 2005 by a professional search firm. The classification search covered Class 307, subclasses 8, 64, and 66; Class 363, subclass 34; Class 365, subclasses 226 and 229; and Class 714, subclasses 14 and 22. A key word search was performed on the USPTO full-text database including published U.S. patent applications. An IDS was submitted at the time of filing the application, identifying one reference. The following references were identified in the search report and in the IDS:

(1)	U.S. Patent Nos.:	
	5,675,816	Hiyoshi et al. (submitted in IDS)
	5,747,889	Raynham et al.
	6,618,821	Duncan et al.
	6,700,829	Abe et al.
	6,795,322	Aihara et al.
	6,833,634	Price

(D) The above references are enclosed herewith, collectively as Exhibit B.

(E) Set forth below is a detailed discussion of the references, pointing out with particularity how the claimed subject matter recited in the claims, amended according to the preliminary amendment filed herewith, is distinguishable over the references.

Claimed Subject Matter of the Present Invention

Independent claim 1 sets forth a disk array apparatus having a connector for connection to an external power supply and an internal power supply section for supplying the power received from the connector after AC/DC conversion. Independent claim 9 sets forth a corresponding method.

The disk array apparatus includes plural disk drive cabinets, each connected to the internal power supply. Each disk drive cabinet includes a first voltage converter for converting the power from the internal power supply to provide power to its constituent disk drive. Each disk drive cabinet further includes a first backup power supply to store power from the internal power supply.

The disk array apparatus further includes a communication adapter connected to the internal power supply. The communication adapter includes a second power converter for converting the power from the internal power supply to provide power to its constituent components. The communication adapter further includes a second backup power supply to store power from the internal power supply.

The disk array apparatus further includes a disk adapter connected to the internal power supply. The disk adapter includes a third power converter for converting the power from the internal power supply to provide power to its constituent components. The disk adapter further includes a third backup power supply to store power from the internal power supply.

The disk array apparatus further includes a memory section connected to the internal power supply. The memory section includes a fourth power converter for converting the power from the internal power supply to provide power to its constituent components. The memory section further includes a fourth backup power supply to store power from the internal power supply.

The disk array apparatus further includes a mutual power supply line that is connected to the disk drive cabinets, the communication adapter, the disk adapter, and the memory section. The mutual power supply line is operable to supply power, in the case of interruption of power from the internal power supply, to the other components using at least one of the first backup power supply, the second backup power supply, the third backup power supply, or the fourth backup power supply.

U.S. Patent No. 5,675,816 Hiyoshi et al. (submitted in IDS)

The patent to Hiyoshi et al. provides for a Magnetic Disk Subsystem with Failsafe Batter Charging and Power Shut Down. Disclosed is a magnetic disk apparatus comprised of a locker 150 housing magnetic disk modules 148-1 to 148-8, AC/DC converters 112-1 to 112-4, and a magnetic disk control apparatus 152. Two of the AC/DC converters 112-1 and 112-2 are connected to a power mother board 160-1, while another two of the AC/DC converters 112-3 and 112-4 are plugged into a power mother board 160-2. Back-up battery units 114-1 to 114-12 are

connected to the mother boards 160-1 and 160-2. The power units 112 and the battery units 114 are connected to the mother boards 160 by a detachable plug-in system.

The reference appears to fail to either anticipate or render obvious at least the following aspects of the claimed invention: disk cabinets, a communication adapter, a disk adapter, and a memory section, each having a corresponding power converter and a backup power supply. The reference does not appear to show or suggest having a mutual power supply line that provisions previously said devices with backup power when power from an internal power supply section is interrupted.

U.S. Patent No. 5,747,889 Raynham et al.

The patent to Raynham et al. provides for a Redundant Power Supply and Storage System. Disclosed is a redundant power supply interconnect system 400 comprising of: first electronic device 402 including first power supply 404, and a second electronic device 406 including control means 408, second power supply 410, and third power supply 412. The first power supply 404 appears to be coupled to first power outlet 420. Bus 416 appears to electrically couple first electronic device 402 and second electronic device 406. Power supplied to storage system control means 408 appears to come from power supplies 410, 412 and power bus 428. Power supplied to storage system 406 from the server, appears to provide immunity from management bus cable segment single point failures and management bus/storage system controller power failures, and server power supply 404 appears to act as a backup source of power for the storage system.

The reference appears to fail to either anticipate or render obvious at least the following aspects of the claimed invention: disk cabinets, a communication adapter, a disk adapter, and a memory section, each having a corresponding power converter and a backup power supply. The reference does not appear to show or suggest having a mutual power supply line that provisions previously said devices with backup power when power from an internal power supply section is interrupted.

U.S. Patent No. 6,618,821 Duncan et al.

The patent to Duncan et al. provides for a Fault Tolerant Network Server having Multiple Slideably-Mounted Processing Elements Sharing a Redundant Array of Independent Disks Through SCSI Isolators. Discussed is a RAID system disk shelf 112, which appears to have two power supplies 120 and 121. Power supply 120 appears to be powered by uninterruptible power supply (UPS) 122, and power supply 121 appears to be powered by UPS 123. UPS systems 123 and 122 may be powered by a backup generator.

The reference appears to fail to either anticipate or render obvious at least the following aspects of the claimed invention: disk cabinets, a communication adapter, a disk adapter, and a memory section, each having a corresponding power converter and a backup power supply. The reference does not appear to show or suggest having a mutual power supply line that provisions previously said devices with backup power when power from an internal power supply section is interrupted.

U.S. Patent No. 6,700,829 Abe et al.

The patent to Abe et al., assigned to the assignee of the present invention, provides for a Memory Package, Memory System and Hot Line Insertion/Removal Method Thereof. Disclosed is a disk control unit 301, which appears to include a plurality of power supply units to power plurality of disk adapter boards, a channel adapter board, plurality of memory packages with a plurality of power feed lines. When the main power supplies of disk control unit 301 are off, memory package 21 appears to be storing data by means of batteries 71-74, which also appear to be connected to the disk and channel adapters.

The reference appears to fail to either anticipate or render obvious at least the following aspects of the claimed invention: disk cabinets, a communication adapter, a disk adapter, and a memory section, each having a corresponding power converter and a backup power supply. The reference does not appear to show or suggest having a mutual power supply line that provisions previously said devices with backup power when power from an internal power supply section is interrupted.

U.S. Patent No. 6,795,322 Aihara et al.

The patent to Aihara et al., assigned to Hitachi, Ltd. and to Hitachi Computer Peripherals Co., Ltd., provides for a Power Supply with Uninterruptible Function. Discussed is a power supply, which appears to be provided with AC/DC converter 1 and battery 4. DC convert 3 appears to convert DC power of battery 4 into a DC voltage of a level substantially equal to the level of the DC output voltage of AC/DC converter 1. Discussed in background is a disk array apparatus converting a commercial AC input to AC/DC.

The reference appears to fail to either anticipate or render obvious at least the following aspects of the claimed invention: disk cabinets, a communication adapter, a disk adapter, and a memory section, each having a corresponding power converter and a backup power supply. The reference does not appear to show or suggest having a mutual power supply line that provisions previously said devices with backup power when power from an internal power supply section is interrupted.

U.S. Patent No. 6,833,634 Price

The patent to Price provides for a Disk Enclosure with Multiple Power Domains. Discussed are power supplies A0, A1 and backup batteries BA0, BA1, which appear to cooperate to provide power for a power domain A. Furthermore, power supplies B0, B1 and batteries BB0, BB1 appear to cooperate to provide power for a power domain B. Shown in figure 4B appear to be various elements in each power domain, such as disk drives, backplane controllers, and memories. Loop A elements on FC-AL board 104 and midplane board 106 may be powered by a first voltage circuit A located on midplane board 106, and loop B elements on FC-AL board 104 and midplane board 106 may be powered by a second voltage circuit B located on midplane board 106.

The reference appears to fail to either anticipate or render obvious at least the following aspects of the claimed invention: disk cabinets, a communication adapter, a disk adapter, and a memory section, each having a corresponding power converter and a backup power supply. The reference does not appear to show or suggest having a mutual power supply

line that provisions previously said devices with backup power when power from an internal power supply section is interrupted.

Conclusion

In view of this comments presented in the instant petition and the claim amendments presented in the accompanying preliminary amendment, the Examiner is respectfully requested to issue a first Office Action at an early date.

Respectfully submitted,

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EXHIBIT A

Search Report for
Application No.: 10/822,116

CONFIDENTIAL
(Pre-examination Search)

I. SEARCH FEATURE

Our search was conducted to find prior art for claims 1-20 of U.S. Application 10/822,116. The claims as generally characterized by a disk array apparatus, comprising: a connector provided for connection with an external power supply to receive power from the external power supply; an internal power supply section for supplying the power received from the connector after AC/DC conversion; a plurality of disk drive cabinets each connected to the internal power supply section, including: a first voltage converter for subjecting the power as a result of conversion by the first voltage converter; and a first backup power supply for storing the power provided to the first voltage converter; a communications adapter connected to the internal power supply section for performing data exchange with an external device, including: a second voltage converter for subjecting the power coming from the internal power supply section to DC conversion to derive a different voltage; a plurality of power consumption circuits for receiving the power as a result of conversion by the second voltage converter; and a second backup power supply for storing the power provided to the second voltage converter; a disk adapter connected to the internal power supply section for controlling data writing or reading to/from the disk drive cabinets, including: a third voltage converter for subjecting the power coming from the internal power supply section to DC conversion to derive a different voltage; a plurality of power consumption circuits for receiving the power as a result of conversion by the third voltage converter; and a third backup power supply for storing the power provided to the third voltage converter; a memory section connected to the internal power supply section for storing data and control information to be written or read to/from the communications adapter and the disk adapter, including: a fourth voltage converter to subject the power coming from the internal power supply section to DC conversion to derive a different voltage; a plurality of power consumption circuits for receiving the power as a result of conversion by the fourth voltage converter; and a fourth backup power supply for storing the power provided to the fourth voltage converter; and a mutual power supply line that is connected to components of the disk drive cabinets, the communications adapter, the disk adapter, and the memory section, and when the power from the internal power supply section is stopped in supply, performs power provisions to any of the components in need of power using the first backup power supply provided to each of the disk drive cabinets, the second backup power supply provided to the communications adapter, the third backup power supply provided to the communications adapter, the third backup power supply provided to the disk adapter, and the fourth backup power supply provided to the memory section.

II. FIELD OF SEARCH

The search of the above features was conducted in the following areas:

A. Classification search

<u>Class</u>	<u>Subclasses</u>	<u>Description</u>
307/		ELECTRICAL TRANSMISSION OR INTERCONNECTION SYSTEMS
	8	... Plural generators
	64	. Substitute or emergency source
	66	.. Storage battery or accumulator
363/		ELECTRIC POWER CONVERSION SYSTEMS
	34	. Including an A.C.-D.C.-A.C. converter
365/		STATIC INFORMATION STORAGE AND RETRIEVAL
	226	POWERING
	229	.. Standby power
714/		ERROR DETECTION/CORRECTION AND FAULT DETECTION/RECOVERY
	14 Of power supply
	22 With power supply status monitoring

The above subclasses represent areas deemed to contain subject matter of interest to one or more of the search features. Please note that relevant references may be classified outside of these areas. The integrity of the search is based on the records as presented to us by the United States Patent and Trademark Office (USPTO). No further integrity studies were performed. Also a key word search was performed on the USPTO full-text database including published U.S. patent applications.

III. RESULTS OF SEARCH

A. References developed as a result of search:

<u>U.S. Patent No.</u>	<u>Inventor</u>
5,747,889	Raynham et al.
6,618,821 B1	Duncan et al.
6,700,829 B2*	Abe et al.
6,795,322 B2*	Aihara et al.
6,833,634 B1	Price

**References assigned to Hitachi, Ltd.*

B. Discussion of related references in numerical order:

The patent to Raynham et al. (5,747,889), assigned to Hewlett-Packard Co., provides for a *Redundant Power Supply and Storage System*. Disclosed is a redundant power supply interconnect system 400 comprising of: first electronic device 402 including first power supply 404, and a second electronic device 406 including control means 408, second power supply 410, and third power supply 412. The first power supply 404 appears to be coupled to first power outlet 420. Bus 416 appears to electrically couple first electronic device 402 and second electronic device 406. Power supplied to storage system control means 408 appears to come from power supplies 410, 412 and power bus 428. Power supplied to storage system 406 from the server, appears to provide immunity from management bus cable segment single point failures and management bus/storage system controller power failures, and server power supply 404 appears to act as a backup source of power for the storage system. The reference appears to fail to either anticipate or render obvious at least the following limitation of applicants' claimed invention: memory, disk and communication adapters each connected to a plurality of power consumption circuits for receiving power as a result of conversion by a voltage converter, each provided a backup power supply connected to voltage converter, and a mutual power supply line that provisions previously said devices with backup power when power from the internal power supply section is stopped (see figure 4, column 4 lines 31-34, 38-40, 50-51, column 7 lines 13-24, 31-36).

The patent to Duncan et al. (6,618,821 B1), assigned to Hewlett-Packard Development Co., L.P. provides for a *Fault Tolerant Network Server having Multiple Slideably-Mounted Processing Elements Sharing a Redundant Array of Independent Disks Through SCSI Isolators*. Discussed is a RAID system disk shelf 112, which appears to have two power supplies 120 and 121. Power supply 120 appears to be powered by uninterruptible power supply (UPS) 122, and power supply 121 appears to be powered by UPS 123. UPS systems 123 and 122 may be powered by a backup generator. The reference appears to fail to either anticipate or render obvious at least the following limitation of applicants' claimed invention: disk adapter and communication adapter, each provided plurality of power supply consumption circuits for receiving power as a result of conversion by voltage converter, and each provided a backup power supply for storing the power provided at the voltage converter, and each connected to a mutual power supply line for providing power from backup batteries when power from internal power supply section is stopped (see column 4 lines 19-25, 29-32).

The patent to Abe et al. (6,700,829 B2), assigned to Hitachi, Ltd., provides for a *Memory Package, Memory System and Hot Line Insertion/Removal Method Thereof*. Disclosed is a disk control unit 301, which appears to include a plurality of power supply units to power plurality of disk adapter boards, a channel adapter board, plurality of memory packages with a plurality of power feed lines. When the main power supplies of disk control unit 301 are off, memory package 21

appears to be storing data by means of batteries 71-74, which also appear to be connected to the disk and channel adapters. The reference appears to fail to either anticipate or render obvious at least the following limitation of applicants' claimed invention: a connector provided for connection with an external power supply to receive power from the external power supply, and a voltage converter for subjecting the power as a result of a conversion by a first voltage converter (see figures 2, 3, column 5 lines 30-36, 40-42).

The patent to Aihara et al. (6,795,332 B2), assigned to Hitachi, Ltd.; Hitachi Computer Peripherals Co., Ltd., provides for a *Power Supply with Uninterruptible Function*. Discussed is a power supply, which appears to be provided with AC/DC converter 1 and battery 4. DC convert 3 appears to convert DC power of battery 4 into a DC voltage of a level substantially equal to the level of the DC output voltage of AC/DC converter 1. Discussed in background is a disk array apparatus converting a commercial AC input to AC/DC. The reference appears to fail to either anticipate or render obvious at least the following limitation of applicants' claimed invention: a plurality of disk drive cabinets each connected to the internal power supply section, and a communication adapter, a disk adapter, a memory section, each comprising a plurality of power consumption circuits for receiving the power as a result of conversion by the second voltage converter, and each provided a backup power supply for storing the power provided to the voltage converter and a mutual power supply supplying backup power to disk drive, communication and disk adapters, and memory in case of a stop in the internal power supply (see column 2 lines 51-56).

The patent to Price (6,833,634 B1), assigned to 3PARdata, Inc., provides for a *Disk Enclosure with Multiple Power Domains*. Discussed are power supplies A0, A1 and backup batteries BA0, BA1, which appear to cooperate to provide power for a power domain A. Furthermore, power supplies B0, B1 and batteries BB0, BB1 appear to cooperate to provide power for a power domain B. Shown in figure 4B appear to be various elements in each power domain, such as disk drives, backplane controllers, and memories. Loop A elements on FC-AL board 104 and midplane board 106 may be powered by a first voltage circuit A located on midplane board 106, and loop B elements on FC-AL board 104 and midplane board 106 may be powered by a second voltage circuit B located on midplane board 106. The reference appears to fail to either anticipate or render obvious at least the following limitation of applicants' claimed invention: a connector provided for connection with an external power supply to receive power from the external power supply, and a voltage converter for subjecting the power as a result of a conversion by a first voltage converter (see figure 4A, column 8 lines 8-17).

Julia Tanase

EXHIBIT B

Table of Contents and References for Application No.: 10/822,116

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U.S. Patent No. 5,675,816 to Hiyoshi et al.	1
U.S. Patent No. 5,747,889 to Raynham et al.	2
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U.S. Patent No. 6,700,829 to Abe et al.	4
U.S. Patent No. 6,795,322 to Aihara et al.	5
U.S. Patent No. 6,833,634 to Price	6